European Commission

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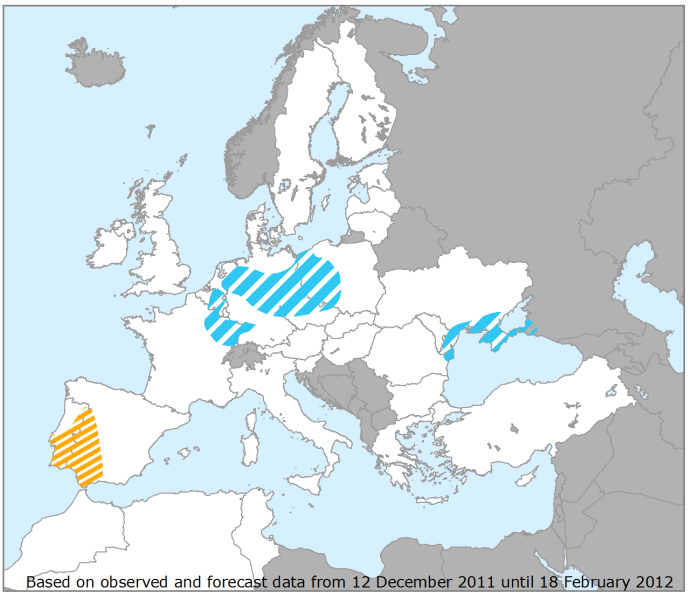
Crop Monitoring in Europe

MARS BULLETIN Vol.20 No. 2 (2012)

Frost kill damage expected for Western and Eastern Europe following the recent cold spell

AREAS OF CONCERN



Data source: MARS crop yield forecasting system 09.02.2012

Since 26 January Europe has been hit by a severe cold spell. The mild winter up until then had partly prevented winter cereals from hardening and left them vulnerable to frost kill damage in western Europe but also in western Poland, the Czech Republic and around the Black Sea.

Frost kill due to the current cold spell is very likely in eastern France, the Benelux countries, Germany, Poland and the Czech Republic and also in Ukraine. The cold spell will continue, with sharp frosts in central and eastern Europe.

Heavy precipitation is forecast in south-eastern Europe, in the area between the Black Sea and the Adriatic Sea. Dry weather conditions will persist in France, Spain and Portugal, aggravating the precipitation deficit.

Observed temperatures

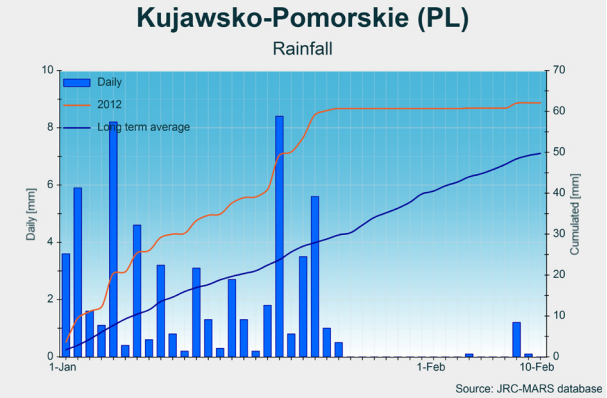
Due to the cold spell caused by an anticyclone centred over Russia and then anchored over Scandinavia pushing very cold and dry air masses towards central Europe, the mean temperature over the period covered was -2 to -4°C colder than average in France, the Benelux countries, Italy, Germany and central Europe. Moving eastwards, mean temperatures were -4 to -6°C colder in Poland, the Baltic States and Ukraine. The cold spell brought sharp frosts to Europe and daily maximum temperatures have not risen above 0°C since 28 January from Germany eastwards towards Russia. At the beginning of February, days as cold as -16°C on average were recorded in Poland and Germany. Absolute minimum temperatures fell below -20°C. The lowest temperatures occurred around the Baltic Sea, in Belarus, in Ukraine and in the European part of Russia. Only a few Mediterranean and Atlantic coastal areas remained frost-free.

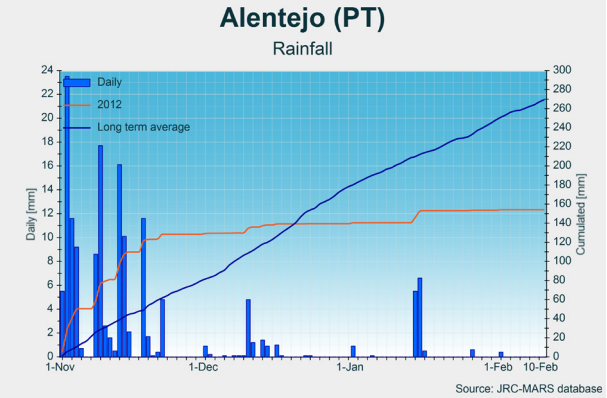
Joint Research Centre

Observed precipitation

Precipitation was abundant from 11 to 25 January in Scotland, the Baltic States, the Benelux countries, Germany, most of the Balkan Peninsula and some areas in Ukraine. Due to the mild temperatures in western Europe, it did not lead to snow cover. Consequently, at the beginning of the cold spell, western Europe was not snow covered or the snow cover was not thick enough to sufficiently protect crops sufficiently over the first days of the frost wave in Poland, the Czech Republic and around the Black Sea.

Considerable amounts of snow fell from 26 January onwards, coinciding with the sharp drop in temperatures in Italy, the Balkans, Turkey and western Ukraine, but Algeria had snow too. Spain and Portugal remained rather dry again, with the accumulated rain deficit since November in the range of 50% to 80%, which could possibly lead to irrigation water supply problems in the next cropping season if the dry weather continues.





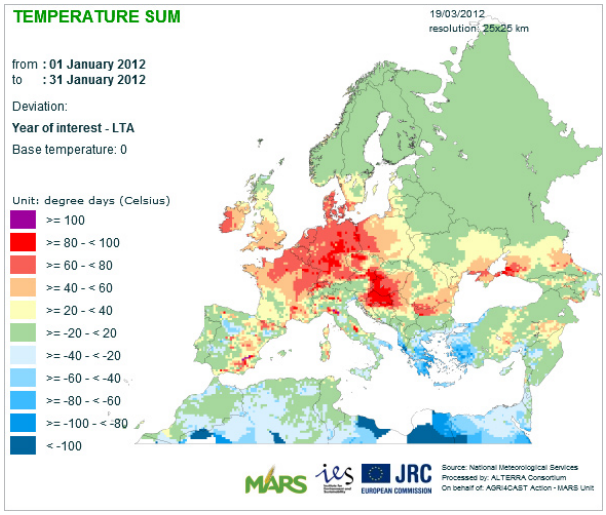
Winter kill analyis based on observed and forecast weather data

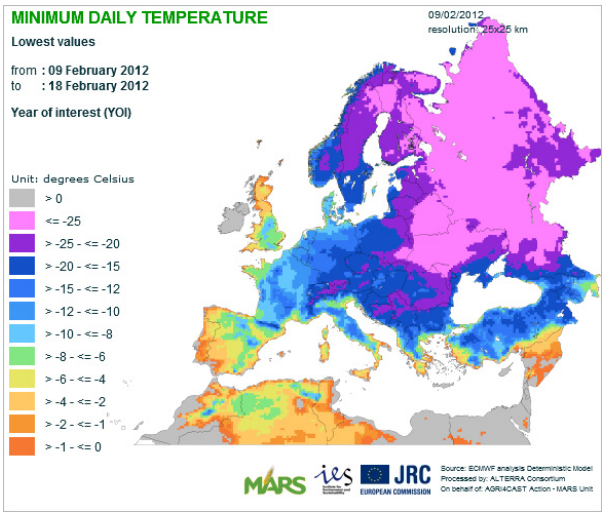
Frost kill due to the current cold spell is very likely in eastern France, the Benelux countries, Germany, Poland and the Czech Republic and also in Ukraine. The cold spell will continue, with sharp frosts in central and eastern Europe.

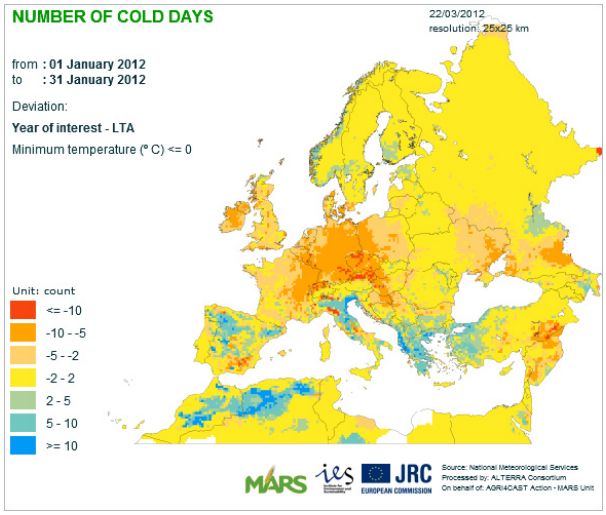
Europe is enduring a harsh cold spell, raising concerns that these very low temperatures in conjunction with the thin snow cover could cause crop damage. In fact, at the beginning of the cold snap the snow cover was non-existent or very thin in western Europe and Poland and also around the Black Sea and in some regions in Ukraine. Later on, a passing frontal system brought plentiful snow to Italy, the Balkans, Romania and Bulgaria at the beginning of February. In addition, the mild weather so far this winter in western and central Europe favoured the wintering of crops but also prevented them from hardening. Our model simulates the hardening index of a crop and thus provides an estimate of the low-temperature tolerance of cereals, taking into account plant physiology (hardening process, i.e. transformation of the cellular starch into glucose, thereby raising the freezing point of the cellular liquids). In our model a fully hardened winter cereal is considered to tolerate –18°C. So even if the crop is fully hardened, the current cold spell could damage it, with temperatures below –20°C and no insulation effects thanks to sufficient snow cover (> 15 cm). The simulation shows that in western Europe the meteorological conditions needed so that crops could harden sufficiently were not fulfilled. In western Poland and around the Black Sea too crops are considered to have only slightly hardened. This is reflected in for those zones the number of days when the killing temperature for winter crops was reached from 21 January until 6 February, taking into account the hardening index of the crops and the insulating effect of the snow cover. The model also permits estimation of the temperature at the 'crown' level (the part of the plant stem located a few millimetres below soil level, where differentiation of the spikelet occurs during the winter), which is mainly influenced by snow layer depth. If this temperature drops below the estimated cellular freezing point (or 'killing temperature'), significant reductions of plant population are expected (very high risk of crop failure). As the harsh temperatures are forecast to continue in Germany, eastern France, western Poland and the Krim region in Ukraine, these areas will face

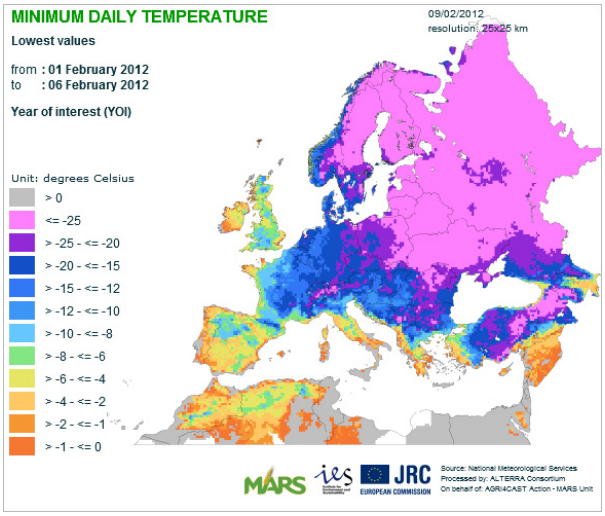
ATLAS MAPS

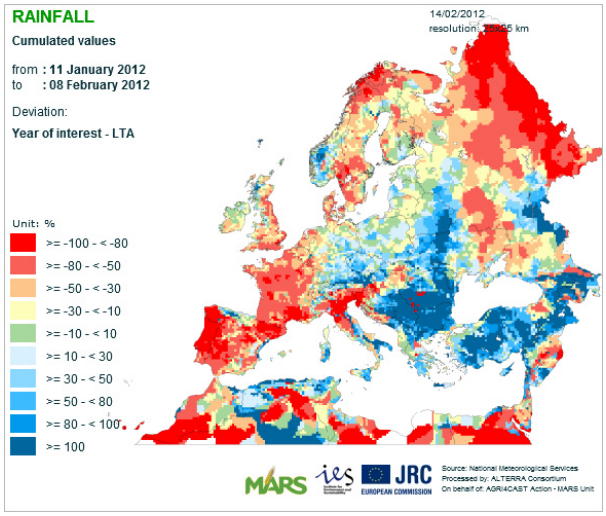
Temperatures and precipitation

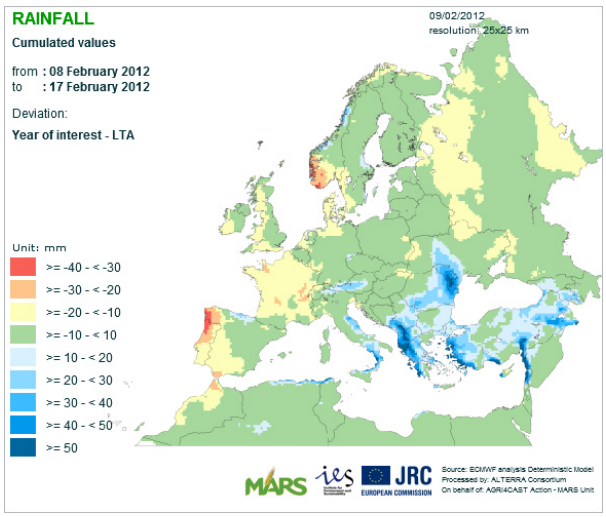












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2012 MARS Bulletins

Date	Publication	Reference
13 Jan	Agromet. analysis	Vol. 20 No. 1
10 Feb	Agromet. analysis	Vol. 20 No. 2
26 Mar	Agromet. analysis and yield forecast	Vol. 20 No. 3
23 Apr	Agromet. analysis, remote sensing analysis, and yield forecast	Vol. 20 No.4
29 May	Agromet. analysis, remote sensing analysis, and yield forecast, pasture analysis	Vol. 20 No. 5
25 Jun	Agromet. analysis, remote sensing analysis, and yield forecast, pasture update	Vol. 20 No. 6
23 Jul	Agromet. analysis, remote sensing analysis, and yield forecast, pasture update, rice analysis	Vol. 20 No. 7
27 Aug	Agromet. analysis and yield forecast, pasture update	Vol. 20 No. 8
24 Sep	Agromet. analysis, remote sensing analysis and yield forecast, pasture update	Vol. 20 No. 9
22 Oct	Agromet. analysis, remote sensing analysis and yield forecast, pasture analysis, rice analysis	Vol. 20 No. 10
26 Nov	Agromet. analysis, campaign review and yield forecast	Vol. 20 No. 11
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***MARS** stands for Monitoring Agricultural Resources

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